

ADVANCED SUBSIDIARY GCE UNIT MATHEMATICS

Core Mathematics 2 THURSDAY 7 JUNE 2007

Morning

4722/01

Time: 1 hour 30 minutes

Additional Materials: Answer Booklet (8 pages) List of Formulae (MF1)

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the spaces provided on the answer booklet.
- Answer **all** the questions.
- Give non-exact numerical answers correct to 3 significant figures unless a different degree of accuracy is specified in the question or is clearly appropriate.
- You are permitted to use a graphical calculator in this paper.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 72.

ADVICE TO CANDIDATES

- Read each question carefully and make sure you know what you have to do before starting your answer.
- You are reminded of the need for clear presentation in your answers.

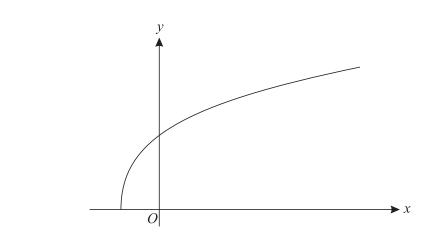
This document consists of **4** printed pages.

$$u_1 = 15$$
 and $u_{n+1} = 0.8u_n$ for $n \ge 1$.

(i) Write down the values of u_2 , u_3 and u_4 .

(ii) Find
$$\sum_{n=1}^{20} u_n$$
. [3]

- 2 Expand $\left(x + \frac{2}{x}\right)^4$ completely, simplifying the terms. [5]
- 3 Use logarithms to solve the equation $3^{2x+1} = 5^{200}$, giving the value of *x* correct to 3 significant figures. [5]



The diagram shows the curve $y = \sqrt{4x + 1}$.

- (i) Use the trapezium rule, with strips of width 0.5, to find an approximate value for the area of the region bounded by the curve $y = \sqrt{4x + 1}$, the *x*-axis, and the lines x = 1 and x = 3. Give your answer correct to 3 significant figures. [4]
- (ii) State with a reason whether this approximation is an under-estimate or an over-estimate. [2]
- 5 (i) Show that the equation

$$3\cos^2\theta = \sin\theta + 1$$

can be expressed in the form

$$3\sin^2\theta + \sin\theta - 2 = 0.$$
 [2]

(ii) Hence solve the equation

$$3\cos^2\theta = \sin\theta + 1$$
,

giving all values of θ between 0° and 360°.

[5]

[2]

4

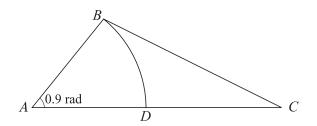
6 (a) (i) Find
$$\int x(x^2 - 4) dx$$
. [3]

3

(ii) Hence evaluate
$$\int_{1}^{6} x(x^2 - 4) dx$$
. [2]

(b) Find
$$\int \frac{6}{x^3} dx$$
. [3]

- 7 (a) In an arithmetic progression, the first term is 12 and the sum of the first 70 terms is 12915. Find the common difference. [4]
 - (b) In a geometric progression, the second term is -4 and the sum to infinity is 9. Find the common ratio. [7]



The diagram shows a triangle ABC, where angle BAC is 0.9 radians. BAD is a sector of the circle with centre A and radius AB.

- (i) The area of the sector BAD is 16.2 cm^2 . Show that the length of AB is 6 cm. [2]
- (ii) The area of triangle ABC is twice the area of sector BAD. Find the length of AC. [3]
- (iii) Find the perimeter of the region *BCD*.
- 9 The polynomial f(x) is given by

$$f(x) = x^3 + 6x^2 + x - 4.$$

- (i) (a) Show that (x + 1) is a factor of f(x). [1]
 - (b) Hence find the exact roots of the equation f(x) = 0. [6]
- (ii) (a) Show that the equation

$$2\log_2(x+3) + \log_2 x - \log_2(4x+2) = 1$$

can be written in the form f(x) = 0.

(b) Explain why the equation

$$2\log_2(x+3) + \log_2 x - \log_2(4x+2) = 1$$

has only one real root and state the exact value of this root. [2

8

[2]

[5]

[6]

4

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